Tax Housing or Land? Distributional Effects of Property Taxation in Germany

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*The views expressed herein are those of the authors and do not necessarily reflect those of the respective Institutions, Executive Board, or management.

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- **Research Question**: What are the aggregate and distributional effects of replacing a property tax based on house values with a LVT?
- **This project**:
  - We offer new empirical evidence on the distributional impact at a household level of a switch from housing taxation to LVT, building a unique data set for Germany.
  - We build the first theoretical model which incorporates both the distributional impacts and the efficiency gains from adopting a Land Value Tax.

Empirical

- Papers on distributional consequences are **scarce and inconclusive** (regional analysis only):
  - England and Zhao (2005): Data from New Hamphshire → **Regressive LVT**.
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Theoretical

- Theoretical **literature has focused on efficiency** and intergenerational inequality (OLG models).
- We **contribute to the literature** by building the first model which replicates our novel empirical findings and allows for policy experiments which captures efficiency-equity trade-off in a model with heterogeneous households and regions.

Preview of Results

- **Empirical**
  - Average **land value share** is 33% with **substantial dispersion**, between and within regions.
  - We find **potential for substantial differences in tax burdens** under the different regimes.
  - Concerning **relation with income**, we find a revenue neutral switch to a LVT to be slightly regressive (in partial equilibrium).
- **Model**
  - Switch to a land tax leads to **more investment** in structures and **lower housing rents**, benefiting renters.
  - **Slight regressive tendency** for landowners. **Most landowners benefit** or are mostly unaffected.
  - **Social welfare improves** with a land tax.

Data

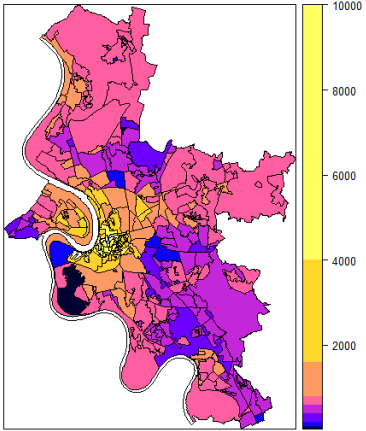

Figure: Land value data for the city of Dusseldorf in € per m^2. Log scale.

- Start from **German Household Survey** (SOEP) for **2017** and expand it with
  - **Land value data** (*Bodenrichtwerte*): euros per square meter.
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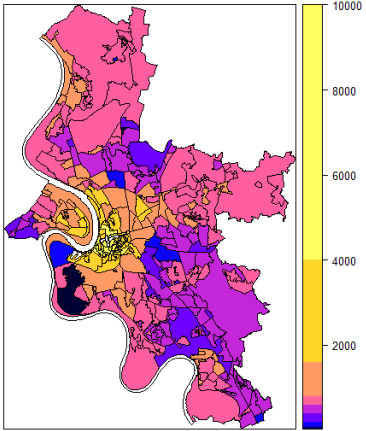

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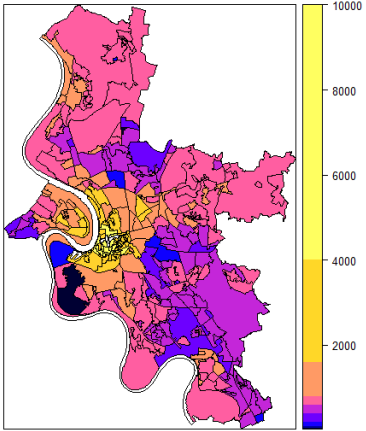

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- Data on five German States → Condition on primary residences of **homeowners**
- **Geographically match** the location of each household in the survey to its respective land value and lot characteristics.

Regional Results

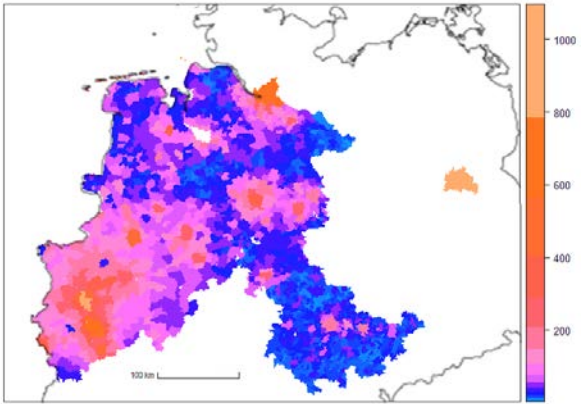

Figure: Map of Average Municipality Land Prices for the German states in sample.
Log scale.

- Large **regional heterogeneity** in average land values.
- **Exponential** growth in cities (and within cities)
- Total land value is 1.5€ trillion, **1.2 times GDP** $\rightarrow$ Annual land rents between 4 and 10% of output in developed nations.
- 90% is non-agricultural land.
- Average revenue revenue land value tax rates are 0.6% on average.

Distributional results

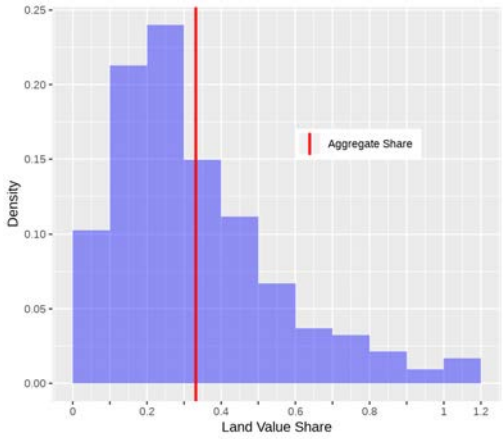

Figure: Histogram of Land Value Share at household level. Vertical led line represents average of full sample.

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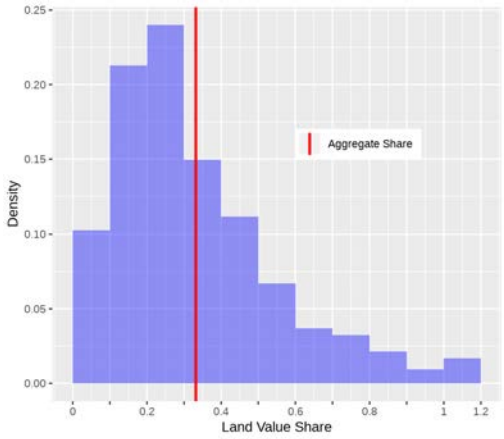

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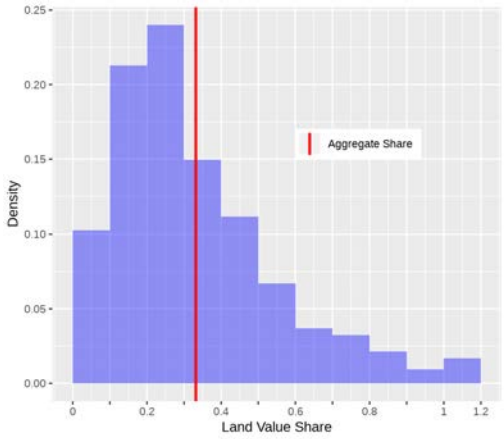

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- Average Land Value Share (LVS) of full sample is 33% (regional heterogeneity).
- Substantial dispersion → potential for large changes in tax burden.
- Novel findings on LVS
  - Large heterogeneity within region.
  - Substantial dispersion within income level.
  - Negative correlation with income within region. → **Equity cost**. More

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- Capital supplied at **exogenous interest rate** from international markets.
- **Land in fixed supply** within each region z: $T_{L,z} + T_{F,z} = T_z$
  - Exogenous share of land held by a housing firm (T_F) which rents housing to renter households and consumption good firm.
  - Rest of land held by landowner households (T_L).

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- **Fixed total share of Renters and Landowners** in the economy spread across the two regions. **Renters can move** between regions; **Landowners cannot**.
- **Mechanism**: House value tax increases marginal cost of structures investment (of households and housing firm) through higher tax burden, decreasing housing in the economy. Land value tax does not. More

Policy Experiment - Aggregate

	Urban	Rural
Prices		
Wage	0.28	0.31
Price of Housing	-2.14	-0.78
Price of Land	-3.59	7.17
Quantities		
Population	-1.30	4.35
Structures (Firm)	2.06	7.93
Housing (Firm)	0.84	6.96
Structures (Landlords)	2.36	5.18
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Utility	1.11	0.40
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Table: Changes (in %) from steady state of model with regional housing taxes. Change in utility of renters measured using consumption equivalent variation.

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- **Migration** from urban region $\rightarrow$ Land tax promotes **regional convergence**.

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- **Renters benefit** (especially in urban regions)

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  - Overall, small changes in utility for landowners in urban areas.
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- Overall, social **welfare improves** with a land tax due to effect on renters and rural landowners.

Conclusion

- Empirical
  - Household level dataset based on official land values.
  - Identify houshehold **distributions of land and house value** and their **relation to income**.
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- Land tax shows promise, but implementation should consider adverse distributional effects.

THANK YOU!

APPENDIX

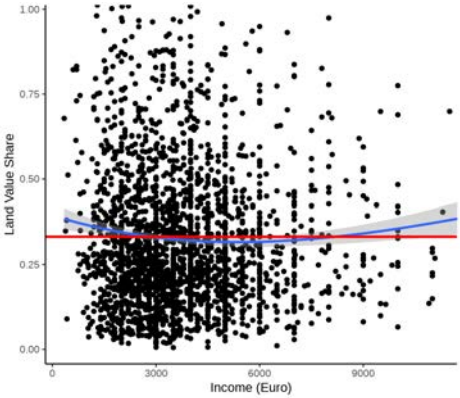
Land value share and Income

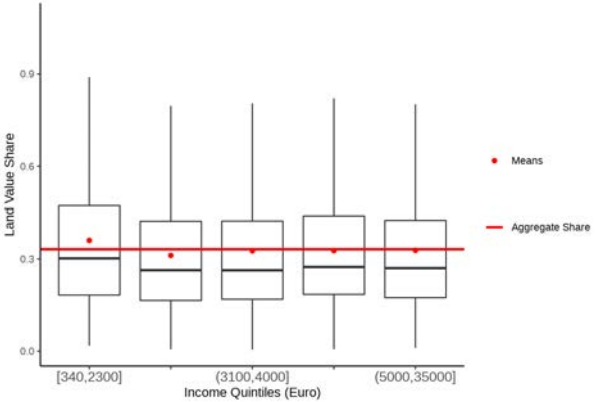
	(1)	(2)	(3)
Intercept	-1.191***	-2.781***	-1.599***
	(0.246)	(0.068)	(0.224)
Average Land Value		0.294***	0.310***
		(0.014)	(0.014)
Income	-0.019		**-0.155*** **
	(0.030)		(0.028)
N	2359	2359	2359
R^2	0.000	0.164	0.174

Table: Log-log regressions of household Land Value Share.

- Average land value of region has a strong impact on LVS, around 0.3.
- Coefficient on income controlling for average land value: **-0.155**. More
- LVT is, on average, **less progressive** than a standard property tax at a regional level.
- **Reason**: Land value is more concentrated, but correlates less strongly with income than house value. Back

LVS and Income - Federal implementation





- OLS coefficient is not statistically different from zero. Back

Households - Landowners

- **Intertemporal** problem. Choose consumption and investment in structures, $s_{L,t}$, (subject to depreciation).
- 25 i subtypes ($\{\theta, \eta\}$ pairings):
  - 5 Productivity (θ) subtypes
  - 5 Land holding (η_T) subtypes

$$\max_{\{C_{Li,t}, S_{Li,t}\}_{t=0}^{\infty}} \quad \sum_{t=0}^{\infty} \beta^t \frac{\left(C_{Li,t}^{\gamma} H_{Li,t}^{1-\gamma}\right)^{\sigma}}{\sigma} \tag{1a}$$

$$s.to$$

$$(1-\tau^L)\theta_{Li} w_{z,t} L_{Li} - \tau_z^H p_{z,t}^H H_{Li,t} - \tau_z^T p_{z,t}^T \eta_{T,i} T_{L,z} + \eta_{F,i}\Pi_{H,z} \geq C_{Li,t} + p_{z,t}^S s_{Li,t} \tag{1b}$$

$$H_{Li,t}^S = G(\eta_{T,i} T_{L,z}, S_{Li,t}) = \phi_H \left[a S_{Li,t}^{\chi} + (1-a)(\eta_{T,i} T_{L,z})^{\chi}\right]^{\frac{1}{\chi}} \tag{1c}$$

$$S_{Li,t} = (1-\delta) S_{Li,t-1} + s_{Li,t} \tag{1d}$$

- Pay taxes on labor earnings and house rents or land rents.
- Produce housing using land and structures with CES function. Back

- **Housing tax increases marginal cost** of investment in structures today and tomorrow.

$$\frac{\partial U}{\partial H}\frac{\partial H}{\partial S} + \beta(1-\delta)\frac{\partial U}{\partial H}\frac{\partial H}{\partial S} = \lambda_{L,t}\left[p^S_{z,t} + \tau^H p^H_{z,t}\frac{\partial H}{\partial S}\right] + \lambda_{L,t+1}\left[\tau^H p^H_{z,t+1}(1-\delta)\frac{\partial H}{\partial S}\right]$$

- **Taxation of land rents** does not distort marginal incentives to build structures, nor does it reduce the overall quantity of land in the economy.
- Housing firm (owns rest of the land) is subject to a similar problem, which will impact its profits.
- Solve recursive problem computationally.

Back

- Problem of housing firm:

$$\max_{\{S_{F,z,t}\}_{t=0}^{\infty}} \quad \sum_{t=0}^{\infty} \beta^t \left[(1 - \tau_z^H) p_{z,t}^H H_{F,z,t} - p_{z,t}^S s_{F,z,t} - \tau_z^T p_{z,t}^T T_{F,z} \right] \tag{2a}$$

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- **Inputs**: Land and Structures (CES with constant returns to scale). Chooses structures to buy from structures' firm.
- **Sells** housing services to **renter and consumption good firm** (apartment vs. office buildings.)
- Pays **taxes** on housing or land, like landowner households.
- **Price of land** = marginal productivity of land
- **Profits** (rents from land and existing structures) distributed to landowners.

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- Calibrate exogenous **distribution of land and households** across regions to match relevant statistics for Germany.
  - Home ownership rate (50%).
  - Share of homeowners in urban regions (44%).
  - Size of urban and rural regions (determined using municipal and land value data).
  - Average regional land value shares.

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- **Tax on housing** set to match percentage of property tax revenue in GDP (1.2%). Back

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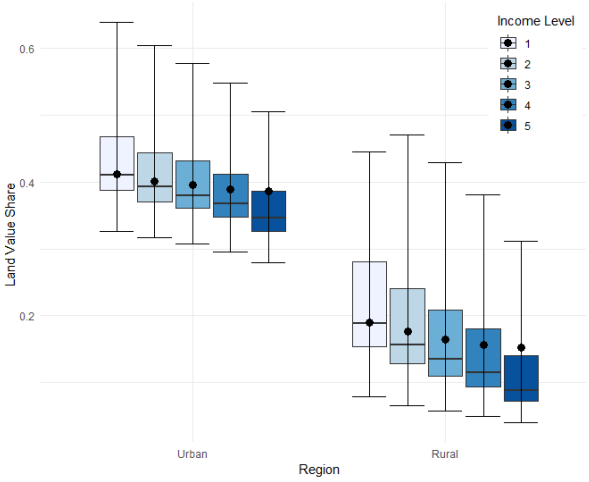
  - Different **regional averages**
  - **Negative relation with income**
  - Substantial **dispersion** within income level

Baseline



- Model does a good job replicating regional differences in prices (wages, housing and land)
- Households in rural region consume more housing and less tradable good.
- Model land value shares match:
  - Different **regional averages**
  - **Negative relation with income**
  - Substantial **dispersion** within income level

Figure: Boxplots of land value share for the baseline model.

Policy Experiment - Distributional 2

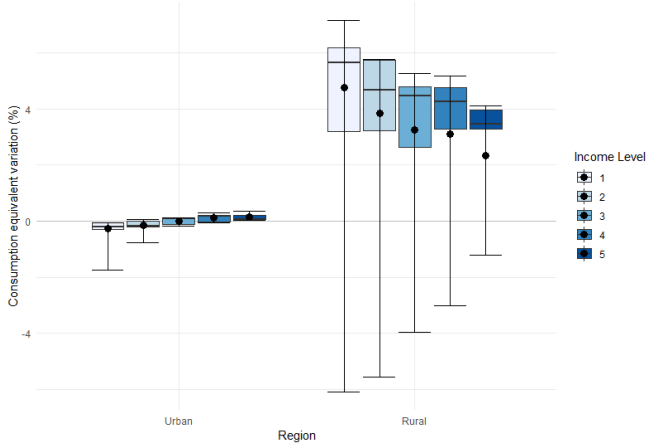


Figure: Change in welfare from switching to land tax (consumption equivalent variation).

- Bigger changes in rural region
  - Bigger impact
  - Different relative size of housing firm
- In rural region, most benefit.
- Landowners with **high land holdings** can lose significantly (especially rural and low income)
- **Social welfare increases** under a LVT Back